SPECIFICATION AMENDMENTS

Please amend the following paragraphs in the specification as indicated.

[0002] This is not an easy task taking into account the constraints of the process that is involved. A cylindrical magnetron sputters material from a rotating target tube onto the glass as it is transported past the target. In order to coat such a large piece of glass the target tube can be up to 15 feet in length and 6 inches in diameter and can weigh 1700 pounds. Another complication is that the sputtering actually erodes the target tube during the sputtering process, so the target tube is constantly changing shape during its serviceable lifetime. The sputtering process can require that an extremely high AC or DC power (800Amps DC, 150 kW AC) be supplied to the target. This power transfer creates extreme heat in the target tube and the surrounding components, which must be cooled in order <u>to</u> assure proper performance and to avoid catastrophic failure of the magnetron. Thus, water is pumped through the center of the rotating target tube at high pressure and flow rate. Efficient and effective sputtering also requires that the process take place in a vacuum or a reduced pressure relative to atmosphere. Thus the rotating target must have a very robust sealing system to prevent the high pressure water from leaking into the vacuum environment.

[0009] Figure 2A illustrates a cross section of an ideal target tube. Target tube 110 has opposing faces 110a and 110b. In ideal conditions face 110a and 110b will be parallel to each other and perpendicular to the centerline 110c, the axis of rotation of target tube 110. Ideally, the inner diameter <u>(ID)</u> at face 110a will be concentric with the outer diameter <u>(OD)</u> at face 110a. Likewise, the inner diameter at face 110b will ideally be concentric with the outer diameter at face 110b, and the inner diameter of the tube will be concentric with the outer diameter anywhere along the length of the tube. In reality, this is rarely true because it is not only difficult to manufacture such a tube, but also to inspect the tube throughout its entire length, and thereafter reject it as out of spec. Furthermore, as discussed earlier, the tube actually changes shape during normal operation as material is sputtered from the tube. Face 110a and 110b may not be parallel in one or often multiple axis of reference, as shown in Figure 2B-2D. Figure 2B illustrates a simple sag of the target tube. Figure 2C illustrates warpage of the target tube above and below the axis of rotation. Figure 2C illustrates

complex warpage of the target tube wherein the warping occurs in more than one plane. The net result is eccentric rotation of the target tube. The length of target tubes can also vary due to machining variations and also from elongation of the tube as it heats up. This elongation is an additional stress in a rigid support system.

[0040] The outboard face of drive cup 210 has opposing slots 210a to accommodate drive pins 240 on drive plate 218 secured to the output shaft of gearbox 220. Slots 210a are elongated so it is easy to line up drive cup 210 with drive plate 218 and gearbox 220. As the gearbox rotates, the pins will eventually contact the ends of slots ~~211~~ <u>210a</u> and initiate rotation of endcap 202 and thus the target tube (not shown). This interface between the pins 240 and drive cup 210 is a third axially compliant interface.

[0045] The water endblock 300 generally supports the rotating target tube 362 while circulating water through the target tube, and providing the electrical power to the target tube for the sputtering process. Water arrives through the dual purpose water manifold/electrical block 330. This brass block is not only a water manifold, but also acts as an electrical manifold and heat sink. For convenience during the assembly process and for subsequent maintenance including replacement of the electrical components and the target tube, the electrical supply lines are broken into replaceable segments. Power is brought to the manifold 330 by a first set of segments (not shown) and connected to segments ~~340~~ leading to the target tube. The junction of these segments (not shown) is at the water manifold/electrical block 330. The high current and voltage carried by these segments is transferred at the water manifold so that the high heat that will develop at the junction between the wire segments is dissipated by the water cooled brass block 330. The water then flows through flexible water lines 316 made of a compliant material such as rubber. In Figures 6 and 7, only two of the four water lines are shown. In Figure 8 all four water lines can be seen.

[0048] Water first passes through anti-rotation spindle 342 and then through a support tube 366 that supports the magnetic array through the length of the target tube 362. The support tube 366 has a smaller diameter than the target tube and fits concentrically (or eccentrically) within the target tube 362. The water travels to drive endblock 200 within support tube 366 and then returns within target tube 362 outside of support tube 366 in the opposite direction

and back into the water endblock 300. It enters water endblock 300 in the gap between water spindle 320 and anti-rotation spindle 342. It then flows through flow-through bushings ~~348~~ 346 and exits the isolation housing 304 through water lines 316.

[0064] The Water endblock isolation housing 304 incorporates a spindle 320 that accomplishes multiple functions such as supporting and locating a stationary magnetic array internal to the target tube (through anti-rotation spindle 342), transferring the electrical power to/from the target tube via the electrical brush blocks 324 and providing the interface for the supply and return flow of target tube cooling water through water lines 316. The spindle 320 is isolated from direct electrical contact with the primary housing 308 by isolation housing 304. The electrical brush blocks 324 are also within isolation housing 304. The brush block leads (not shown) are individually insulated and are routed as a centrally located bundle within the primary endblock housing ~~124~~ 308 to the water manifold/electrical block 330. The water supply and return lines 316 are insulated and incorporate flexible segments between the isolation housing 308 and the water manifold/electrical block 330. The water manifold/electrical block 330 is mounted on an electrically isolating plate, isolation plate 372, mounted to the interior top surface of the source cover 520 seen in Figures 8 and 9.

[0066] Heating due to the transfer of electrical power to and from the target tube has been controlled, minimized or eliminated by several features. First, conservatively over-sized electrical conductors for DC and AC operations minimize heat generation. Second, conservative or oversized electrical junctions or interfaces such as the large contact face of brush blocks 324 upon water spindle 320 and at the junction of conductors ~~340~~ to water manifold/electrical block 330. Third is the minimization or elimination of physical structures subject to AC inductive heating, which was previously discussed. This particular aspect also aids in raising the operational efficiency by reducing the power losses associated with inductive heating effects. This is because if an element is inductively heated the increased temperature results in increased resistance and thus decreases the conductivity and the efficiency of the system.